Extreme Heat and Air Quality in coastal urban areas

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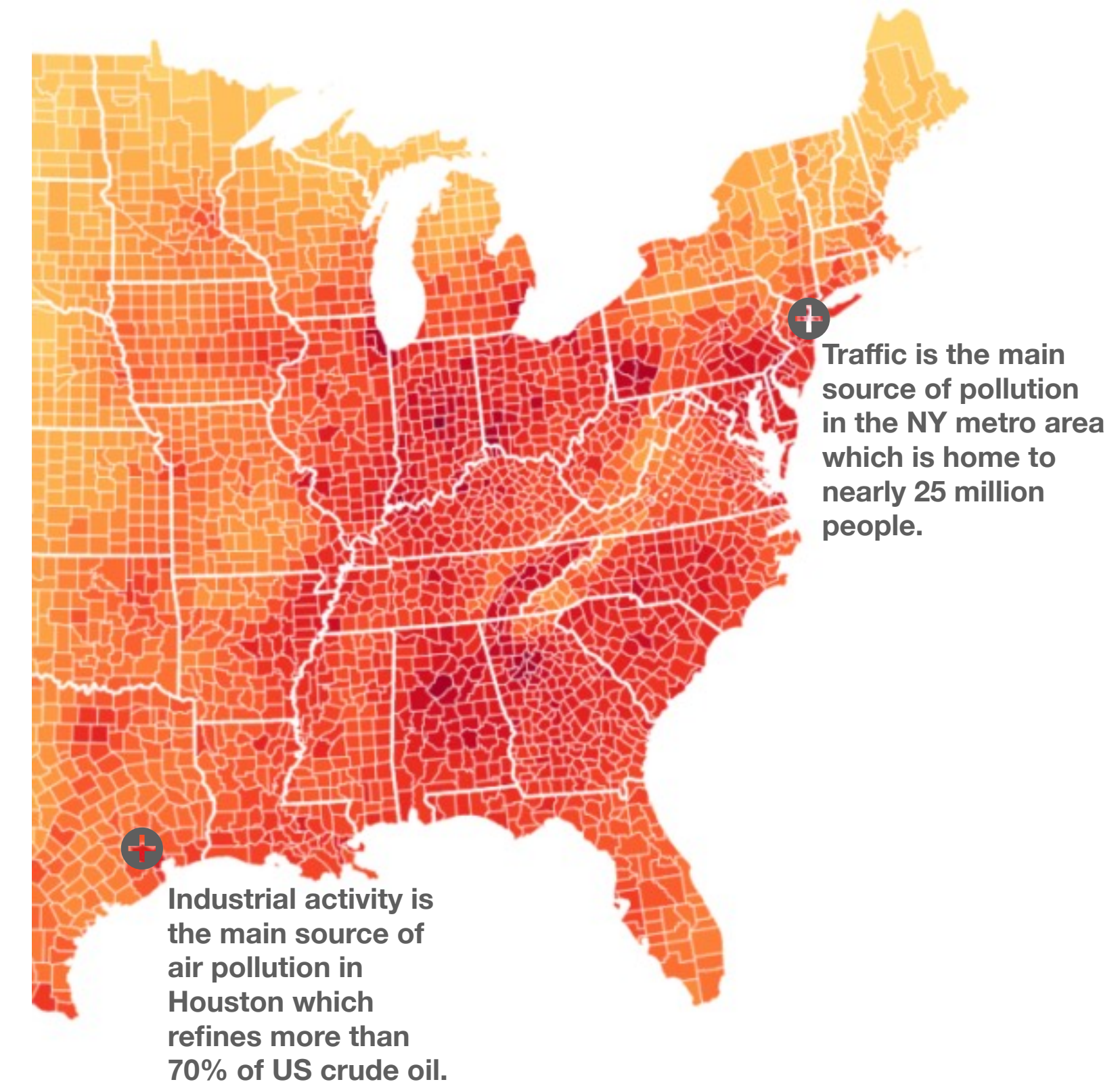
Motivation

The climatology of coastal areas are highly sensitive to sea breeze events. In dense cities, the pollution emitted near the ground is cleared by these sea breeze events. However during extreme heat episodes it has been hypothesized that the wind circulation decreases and as a result the near-surface pollution could increase. Our primary goal in this summer project is to test this hypothesis.

Methods

The project will use publicly available data to test the hypothesis. We will use New York City and Houston, Texas as our coastal urban sites. These two locations have numerous ground stations that sample various pollutants, including Nox, Sox, PM 2.5, that are available to the public. The students will download these data sets and look at how they vary during extreme heat events. We will use weather forecast and other ground weather stations to classify near surface conditions.

Additionally, the students will be given an air quality monitor that they will use to record indoor air quality inside their homes. This will allow them to gain an experiential understanding of how their own health and everyday activity are impacted by these extreme weather conditions.The students will use MATLAB or Python and Arc GIS to do the data processing and visualization. They will meet with the PI 2-3 times a week either in person or through zoom to conduct the research.

Traffic is the main source of pollution in the NY metro area which is home to nearly 25 million people.

Industrial activity is the main source of air pollution in Houston which refines more than 70% of US crude oil.

Outcomes

Improved understanding of air quality climatology in coastal cities. Ability to apply principles of scientific inquiry in to a pressing environmental/health/ social problem. Gain skills in programming and data analysis.